Operating and Maintaining a Tile Drainage System

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Factsheet

ORDER NO. 10-091 AGDEX 752/555 DECEMBER 2010

Figure 1. Aerial view of a tile drainage system.

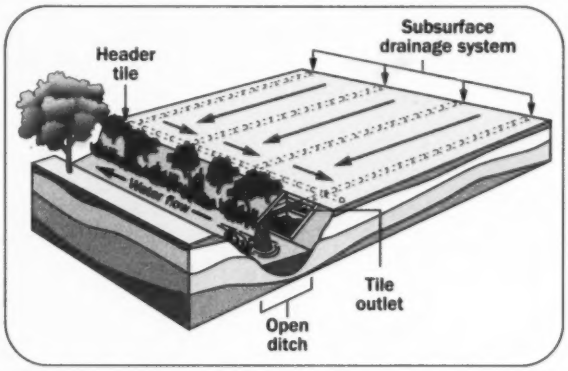

Figure 2. Drawing of a tile drainage system.

A tile drainage system requires proper operation, ongoing inspection and maintenance to minimize environmental impacts and ensure a long, productive life (Figure 1). This Factsheet provides direction on post-installation activities and guidance on land management practices that are best suited for the tile drainage system. It also provides recommendations for annual inspection and maintenance of the drainage system.

IMMEDIATELY AFTER INSTALLATION

The soil around and above a newly installed tile drain will still be loose. Heavy pressure on the loose soil can damage or collapse the tile. To prevent damage:

- Allow rain to help settle the loose soil before working the field.
- Do not use equipment to pack the heaved soil over the tile runs. Driving directly over tile runs can crush the pipe.
- Straddle tile runs with equipment or work across them when working the land in the first year after tile installation.
- Backfill the open trenches carefully, so as not to damage the pipe.
- Do not use the open trench for garbage disposal.
- Clean up unused pieces of pipe promptly.

LAND MANAGEMENT

The tile drainage contractor is responsible for installing the tile at the proper depth, grade and location. However, even a properly installed tile drainage system (Figure 2) will not function effectively if the landowner does not manage the soil properly. Proper land management techniques can prevent problems and extend the life of a tile drainage system.

Avoid soil compaction. It is very difficult for water to move through compacted soil to the tile drains; activities that cause soil compaction can also damage the tile. To avoid soil compaction:

- Avoid working the land before the tile drainage system has had an opportunity to drain the excess water; do not work wet land.
- Avoid crossing a tile repeatedly with heavy equipment.
- Rotate the location of cattle hay feeders.

Other management practices:

- Perform periodic soil tests to keep track of soil structure and nutrient value.
- Maintain good pore openings in the soil through crop rotation.

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- Check available agronomy information on soil management to ensure the use of practices that favour good water infiltration to drains.
- Periodically check the depth of soil over the tile; organic soils can "subside," reducing the cover over the tiles.
- Find out from the tile drainage installer which types of soil are in the field and prepare the land for seeding accordingly.

LAND APPLICATION OF NUTRIENTS

The installation of a tile drainage system is a best management practice that has many positive results for crop production and the environment. However, a subsurface tile drainage system may result in increased "soil macropores" (small pores through the soil that lead directly to the tile). Unless properly managed, applied nutrients can travel easily through these pores, through the tile and into the receiving waterbody, resulting in environmental harm. Only apply nutrients to the land in accordance with the *Nutrient Management Act,* 2002, and regulations. Some general recommendations include:

- Apply nutrients at the recommended rates, using proper methods, and at the correct time of year.
- Avoid applying nutrients when the soil is saturated or the tiles are discharging water.
- After applying nutrients, periodically check the tile outlets for nutrient discharge.
- To avoid soil compaction in your fields, avoid repeated travel in one location when hauling manure.
- Do not apply nutrients in a wide area around surface inlets. If nutrients do enter the inlet, take appropriate measures to stop the flow (such as using shut-off valves).

INSPECTION & ROUTINE MAINTENANCE

The ideal time to inspect the tile drainage system is in the spring before planting and in the fall after a significant rainfall. Assess the efficiency of the drainage system at the following points:

Tile Outlets (or Outfalls)

- Remove all trash or debris that has collected around the outlet.
- Check for signs of erosion around the outlet pipe or in the receiving ditch and check whether water is draining from underneath the outlet pipe. Contact a licensed tile drainage contractor for repairs.
- Make sure the outlet is not plugged.

Figure 3. Riser inlet.

- If the outlet shows signs of nutrient discharge, try the solutions described in *Land Application of Nutrients* and Table 1, Drainage Problems.
- Check for rodent activity around the outlets; if signs are present, arrange to have the rodents removed.
- Make sure the rodent grate on the outlet pipe is in place and working properly.
- Clean the receiving ditch if it is restricting drainage from the outlet. Contact the municipality for repairs of municipal drains. If it is a private ditch, have the work done privately. Be sure to have the required approvals before undertaking any work.

Surface Inlets (catchbasins, riser inlets)

- In addition to the spring and fall inspections, check the inlets after every major rainfall (Figure 3).
- Remove all trash or debris (such as cornstalks) that have accumulated around the inlet.
- If trash often collects around the inlet, install a larger diameter screen (e.g., page wire) around it.
- Check and clean catch basin sumps as needed. Ensure the grates are in place to keep out trash and rodents.

Field Level

- Check for signs of surface erosion in the fields. If found, call a licensed tile drainage contractor for solutions. It may be necessary to install a surface inlet or grassed waterway.
- Check for "blowouts" — holes in the field created when a hole forms in the tile drainage pipe. Mark the location of the blowout and call a licensed tile drainage contractor for repairs.
- Mark the location of wet spots in the field and call a licensed tile drainage contractor to investigate and resolve the problem.

PROBLEMS

Water that ponds on the surface of a field or sections of a field that remain wet are signs of drainage problems. See Table 1 for a list of common drainage problems and suggested solutions.

Table 1. Drainage Problems

Problem	Solution
Soil structure or soil conditions Soil structure problems are often the result of compaction or a lack of organic material and macropores in the soil. If water cannot move through the soil to the tile, the effectiveness of the tile system is reduced, and wet spots appear in the field.	• Subsoil to open up soil for water movement. • Avoid the activities described under *Land Management* to prevent soil compaction. • Plant a deep-rooted crop to improve soil porosity.
Cut tiles Sometimes during the installation of buried utilities such as water lines, pipelines or electrical conduits on the farm, tile pipes are cut, resulting in drainage problems.	• Contact a licensed tile drainage contractor to investigate and make the repair.
Blocked tile from tree, brush or crop roots Some trees (willows, tamarack, poplar and soft maples) will cause trouble if they are within 15 m of a drain.	• Contact a licensed tile drainage contractor to remove and replace the blocked section of tile. • At a minimum, remove trees and brush within 15 m of a tile. • If the blockage is caused by crop roots (such as alfalfa), use crop rotation for prevention.
Tile blocked by rodents Occasionally, rodents will enter a tile and be unable to turn around and exit. The carcass becomes bloated and completely blocks the tile, resulting in wet spots in the field.	• Contact a licensed tile drainage contractor to remove and replace the blocked or damaged section of tile. • Ensure rodent grates are in place.
Blocked tile resulting from iron ochre Iron ochre is a stringy red or orange organic material that can block the openings in the tile. Although organic soils may be the source of ochre, it is difficult to predict the problem in advance. If ochre is present in the soil, the drainage system will have a shorter life expectancy than normal.	• Ask a licensed tile drainage contractor for advice. • Use drain tile with large holes and filter protection. • Disconnect any tiles that drain organic soils from the system. • Keep the tile drains submerged (this sometimes keeps the ochre from appearing).
Blocked tile resulting from organic material Wastes discharging into the tile system from septic systems, milkhouses, silos or barnyards can result in a build-up of organic material. In addition to doing significant environmental harm, it can block the tile.	• Have a licensed tile drainage contractor remove and replace the blocked section of tile. • Disconnect any tiles that discharge wastes from septic systems, milkhouses, silos or barnyards.
Old unconnected tile Old tiles that have been cut during the installation of a new tile system may cause wet spots in the field.	• Contact a licensed tile drainage contractor to investigate and, where appropriate, reconnect the old tile.
Collapsed tile A collapsed or crushed tile is often the result of high traffic over the tile.	• Contact a licensed tile drainage contractor to investigate and replace the crushed section. • Consider using stronger pipe in high-traffic areas.

ADDITIONAL BEST MANAGEMENT PRACTICES

- The plan showing the tile drainage system is very valuable: Preserve it and protect it!
- Over time, the tile outlets may be hidden by grass or brush. Mark the location of all outlets so that they are easily located in the future.
- Keep records of any maintenance performed on the tiles.
- Use mains to reduce the number of tile outlets.
- When building fences, take care to ensure that the subsurface tiles are not damaged by fence posts.
- If connecting an eavestrough to the tile system, make sure a screen is added to the connection.
- Drain surface runoff using ditches, swales or grassed waterways in order to make the tile drainage system work more effectively.
- If installing new buildings or utilities, ensure that the existing tile system is not disturbed.
- Periodically obtain an aerial photograph of your farm to get an overview of the drainage system and to identify potential problems.

Figure 4. A tile plugged with roots.

"DON'TS" OF A TILE DRAINAGE SYSTEM

- Don't connect wastes from milkhouses, septic systems, silos or farmsteads to the tile system. Not only do these wastes cause environmental damage, they can also block the tiles.
- Don't plant trees over or near tile drains; roots can enter the tile and block drainage (Figure 4).
- Don't direct surface flow over a drain outlet; it can erode to the pipe and damage the outlet.
- Don't burn grass around the outlet pipe; it can damage the outlet pipe.
- Don't let livestock trample over the outlet pipes; they can damage the outlet pipe.
- Don't work the land in wet soil conditions, as this compacts the soil and discourages drainage.

With care and good management, a tile drainage system will last a lifetime and yield a well-drained soil able to produce a variety of crops.

RESOURCES

For more information on the planning, design and construction of agricultural drainage systems, see OMAFRA Publication 29, *Drainage Guide for Ontario.*

This Factsheet was written by Sid Vander Veen, Drainage Coordinator, OMAFRA, Guelph, with the generous contribution of time and experience from various members of the Land Improvement Contractors of Ontario (LICO). LICO is an association of professional contractors, suppliers and associated industries principally concerned with agriculture and the land drainage industry of Ontario. Most LICO contractors are involved in the design and installation of subsurface tile drainage systems on agricultural land and are licensed under the *Agricultural Tile Drainage Installation Act*.

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ISSN 1198-712X
Également disponible en français
(Commande n° 10-092)